The remaining three chapters of this work treat of such subjects as substage fittings, coloured screens, and the various subsidiary apparatus useful in high power or "critical" photo-micrography. These particulars do not bear the condensation that is necessitated by the space allotted to this report, but are full of information for the guidance of the photo-micrographic student and will materially assist him in his work. A valuable feature is included in the appendices, and is headed "25 common faults in photo-micrography; their causes and means of cure"; by a reference to p. 152 every error that may present itself in the beginner's work is described, the reason for it given, and the remedy indicated. Added at the end of the book are five plates of representative work in photo-micrography, the work of the author, while a copious index brings the work to a conclusion.

GEORGE KINGSLEY'S LIFE AND WRITINGS.

Notes on Sport and Travel. By George Henry Kingsley. With a memoir by his daughter, Mary H. Kingsley. Pp. viii + 544. (London: Macmillan and Co., Ltd., 1900.)

THIS is a book, we venture to think, that most readers will lay down with deep regret—regret that a very talented writer, an acute observer, and an ardent sportsman (in the best sense of the word) should have bequeathed so little of his experiences to the world. For George Kingsley, a member of a clever family (or, as his biographer will have it, a member of a clever generation of an ancient family), was evidently a man far above the ordinary intellectual level, and enjoyed unrivalled opportunities of adding to our store of knowledge by travel in distant lands at a time when they were still, to a great extent, populated by their native denizens and unspoiled by the march of civilisation. Unfortunately, however, he seems to have been devoid of those regular and methodical habits of work by which alone the results of a life of exploration and travel can be properly recorded, and we have consequently to be content with mere scraps and fragments of a vast store of information.

From such scraps and fragments as the editor, who is to a great extent also the author, of the present volume has been able to save from oblivion, we glean how keen an observer and how true a lover of nature was Dr. Kingsley. Whether among the coral-girt isles of the South Pacific, when they were yet in great part free from the "beach-comber," or on the prairies of the "wild west," at a time when the bison were still to be numbered by hundreds, if not by thousands, his descriptions of scenery and animals are life-like pictures.

The greater part of the account of the author's travels is given in the memoir by his daughter, which occupies more than a third of the whole volume, and is, in great measure, in the form of letters or of extracts from the same. And here we take the opportunity of expressing our sense of the excellent manner in which Miss Kingsley—herself a traveller and writer of world-wide repute—has discharged what must evidently have been a task of no ordinary difficulty.

Kingsley (in company with the late Lord Pembroke) visited the South Seas in the late "sixties"—a time when yachting in those latitudes had not come into vogue; and such descriptions as he has left of the natives and natural products only make us regret that they were not fuller. Fish seem especially to have attracted his attention; but when he states that he disbelieves the story of a *Chaetodon*[1] shooting water at a fly, the editor should have added that the only fish which performs this feat is a species of *Toxotes*, whose southern range only extends to North Australia, so that it could not have come under the ken of the author.

The travels in Canada and the United States were undertaken in company with Lord Dunraven, between 1870 and 1875; parts of them being described by the latter in "The Great Divide."

Of the various collected papers of Dr. Kingsley, perhaps the most interesting to the naturalist is the one entitled "Among the Sharks and Whales." Here the author graphically describes, as an eye-witness, certain encounters between the larger Cetaceans and smaller members of the same order, together, perhaps, with other denizens of the deep. We are told, for instance, how some of these creatures, of thirty feet or so in length, were seen to leap clean out of the water, and then to fall with a sounding "smack" that could be heard half a mile off. But whether the creatures in question were attacking a whale, or leaping for mere fun, the author was unable to determine. Neither could he say definitely whether or no they were "killers." And he seems, indeed, to be somewhat confused between "killers" and "threshers"; although, as to the sharks commonly called by the latter name, he denies that they ever attack whales, adding that he has never even known a shark of any kind throw itself out of the water. R. L.

OUR BOOK SHELF.

Irrigation and Drainage, Principles and Practice of, their Cultural Phases. By F. H. King, Professor of Agricultural Physics in the University of Wisconsin, author of "The Soil." The Rural Science Series. Pp. xxi + 502. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1899.)

THE object of this book, as stated in its preface, is "to present, in a broad yet specific way, the fundamental principles which underlie the methods of culture by irrigation and drainage," and we may say that we consider the author successfully does this.

The introductory chapter treats of the importance of water in cultivation, and in it a number of interesting experiments on the amount of water absorbed by cereals and other plants, and the weight of dry matter produced are described, from which it appears that with cereals the amount of water used varies from about 300 to 500 lbs. per pound of dry matter produced. The general result of these experiments is considered to show "that well-drained lands in Wisconsin, and in other countries having similar climatic conditions, are not supplied naturally with as much water during the growing season as most crops are capable of utilising, and hence that all methods of tillage which are wasteful of soil moisture detract by so much from the yield per acre."

[1] The editor avows a difficulty in deciphering some of the MS. which came into her hands, and therefore suggests the possibility of a certain amount of mis-spelling. Some naturalist friend would, however, doubtless have corrected the following errors, viz.:—P. 61, *Chetadons* for *Chaetodons*; p. 222, *Haroldus* for *Harelda*; p. 414, *Megaptera australis* for *Balaena australis*; p. 421, *Ovules* and *Mutras* for *Olives* and *Mitras*; and p. 424, *Orcus* for *Orca*.

Similar experiments have been made with other crops, as, for instance, potatoes, and the importance of such experiments is, as stated further on in the book, "because only such knowledge as this can show how economical or how wasteful our methods of tillage may be, and how nearly we are realising the largest profits which are possible to the business."

The conditions of rainfall under which irrigation is practised in different parts of the world are discussed, and the means of "conserving the moisture of the subsoil" by proper tillage pointed out. An excellent account is given of the depth of root penetration in the soil, which is illustrated, as is the rest of the book, by some very good and instructive engravings. A short account is given of sewage irrigation; and the idea that the milk of cows fed on sewage produce is in any way detrimental is disposed of by quotations from Sir Henry Littlejohn, and from Mr. Spier, the Scottish Dairy Commissioner. Methods of diverting streams for irrigation are carefully described and fully illustrated, as also are the methods of applying the water to the ground. In Part ii. (a small portion at the end of the book) the necessity for soil drainage is insisted on, and the methods of carrying it out are described.

The book altogether is very readable, although the spelling of some of the words seems curious to an English reader. It is also well printed, and the only misprint noticed is on p. 403, where the word "denitrification" is used instead of "nitrification." W. H. C.

The Refraction of the Eye, including a Complete Treatise on Ophthalmometry. A Clinical Text-book for Students and Practitioners. By A. Edward Davis, A.M., M.D. Pp. 431. (New York: The Macmillan Co., 1900.)

THIS volume should prove a valuable addition to the library of the ophthalmic surgeon, for though several books on retinoscopy have been published, this is the only work on ophthalmometry yet written in English.

It comprises a description of Javal and Schiötz's modification of Helmholtz's ophthalmometer, together with full instructions in the use of the instrument; the necessity of forming a clear mental picture of the state of the eye from the results of an experiment being rightly insisted upon.

One hundred and fifty illustrative cases are included in the text, and a comprehensive index has been appended, so that the student can readily find a parallel to any case which may give him trouble. One hundred and nineteen diagrams, including a clear and well-drawn woodcut of the ophthalmometer of Javal and Schiötz, are distributed throughout the text.

Although the advantages which may be gained by the use of the ophthalmometer are insisted upon, the author has taken great pains to indicate the limitations of its usefulness. By its aid we may determine with accuracy the radii of curvature of the cornea in various meridians; but the author endorses the generally accepted opinion that there is no definite relation between the curvature of the cornea and the refractive condition of the eye, as far as hypermetropia or myopia are concerned. Myopia usually depends upon an elongation, and hypermetropia upon a shortening of the axis of vision. Strangely enough, in cases of extreme myopia, a somewhat flattened cornea is generally met with. Nevertheless, in cases of simple hypermetropia and myopia, the ophthalmometer eliminates the question of corneal astigmatism. The routine of examination followed by the author is (1) use the ophthalmometer; (2) use trial lenses and test cards; (3) use the ophthalmoscope; (4) if after two tests on different days the result is still unsatisfactory, employ a mydriatic and use the retinoscope in addition to the other tests. It is stated that (1) to (3) suffice for 99 per cent. of uncomplicated cases.

In the use of test glasses, it is recommended that a series of positive lenses, gradually increasing in power, should first be employed. By this means spasmodic accommodation is avoided. The fact that the use of atropine can so often be dispensed with is of great importance, since many men might hesitate to have their eyes examined if this necessitated a temporary cessation of their business duties.

A number of instructive cases are included, showing the serious results which may follow on the prescription of unsuitable glasses for a patient. Not only severe pain and inability to use the eyes for any length of time, but even personal disfigurement may be produced. Thus a case is recorded (p. 307) of a patient whose eyes were being forced into a divergent squint by the use of prismatic glasses. After a careful examination, the prisms were discarded and suitable lenses were ordered, with the result that, after two weeks, complete comfort and the possibility of working with satisfaction were enjoyed for the first time for many years.

Altogether this book gives us a good idea of the vast advantages to the human race which have resulted from the optical researches of Helmholtz, culminating in the invention of the ophthalmometer and the ophthalmoscope. E. E.

A Key to the Birds of Australia and Tasmania, with their Geographical Distribution in Australia. By R. Hall. Pp. xii + 116; plate and map. (Melbourne: Mullen and Slade; London: Dulau and Co., 1899.)

WERE it nothing more than a synopsis of Australian birds, with just sufficient in the way of description to enable the different species to be easily recognised, this well-printed little "Key" would be to a great extent of merely local interest. But since the author has very wisely made geographical distribution its leading feature, the work appeals to a much wider circle of students than would otherwise have been the case.

In his Report on the Zoology of the Horn Expedition, Prof. Baldwin Spencer recently divided Australia into three zoological sub-regions; namely, (1) the Torresian, embracing the northern and eastern districts as far as South Queensland; (2) the Barsian, comprising eastern New South Wales, Victoria and Tasmania; and (3) the Eyrean, including the remainder of the mainland. These sub-regions are further split up into "areas," and the fact that bird-distribution accords with such a parcelling-out of the continent from other lines of evidence affords important testimony in support of Prof. Spencer's views. It is noteworthy that the South Queensland area forms the headquarters of the Australian Passeres, a fact for which there must surely be some adequate physical reason, if only it could be discovered. The total number of species recorded is 767, among which the black emu is believed to be extinct; and, so far as we have been able to verify them, the diagnoses of the various groups and species seem well adapted to their purpose. The work appears singularly free from errors and misprints, and ought to be in the hands of every Australian bird-lover. R. L.

Pages Choisies des Savants Modernes. By A. Rebière. Pp. viii + 620. (Paris: Nony et Cie, 1900.)

THIS is a series of extracts (translated into French when not written in that language) from the works of eminent men of science. It appeals mainly to the general reader, and the best that can be hoped of it is that it may induce some members of this class to study the works of one or other man of science seriously. A scientific writer does not appear to the best advantage in "tit-bits" selected from his works; and, except as a possible stimulus, the value of such a miscellany as this cannot be reckoned very high. The portraits, of which there is a considerable number, will probably be found, by scientific readers, the most interesting feature of M. Rebière's compilation.